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(54) **A paper transport device for label printing machines or the like.**

(57) The device according to the present invention comprises a set of rollers supporting and guiding the band of overprintable material to the writing station and beyond to rewinding, and a band transport device moved by step-motor (7) providing for drawing said band through a drawing roller (4) in the intervals between the writing of one line and the next, making electronically controlled and preset intermittent angular rotations, a friction rewinding means (6) being provided.

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**EP 0 036 193 A1**

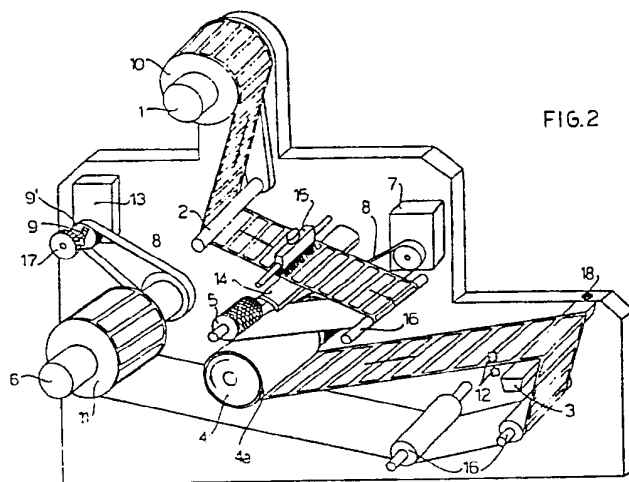


FIG. 2

- 1 -

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"A PAPER TRANSPORT DEVICE FOR LABEL PRINTING MACHINES OR THE LIKE".

- This invention relates to a device for unwinding and rewinding reels of labels or other self-adhesive documents
5. in the form of continuous modules which are mounted on a siliconized support, said device being adapted for use along with overprinting machines of electronic type. Particularly, the invention is concerned with the separation of the label from its support or backing during the rewinding process.
  10. The overprinting machines for self-adhesive labels or the like at present commercially available are basically in the

- 2 -

following overprint types.

- a - Frame-mounted inked matrix, which is carried out by typewriting the text on a typewriting machine.
- b - Inked matrix with composable metal letters of the printing type. These matrices may be planar or rotary cylinder matrices.
- 5. c - Needle writing head (printer of a processor) scanning the whole label surface.

- All of these embodiments provide the displacement or shifting of the label or the like when overprint is being carried out, or at the immediately preceding moment, but in any case by a spacing equal to an entire label at a time, by using an A.C. or D.C. motor. This motor moves the paper only once by a full pitch (a pitch includes a label and the inter space between two successive labels) using this space as a reference. This is because the force required for separating the label or the like from its support or backing can be effected only by a motor developing a certain torque.
- 10.
  - 15.

- In the first two of the above mentioned cases, a text composition requires some time which does not allow the use of this type of machines for limited series of labels. The use of these printing machines becomes particularly difficult when producing labels, in which the variability of the text to be written and the number of variables is such that the amount of
- 20.

- 3 -

identical labels is so small to require the use of writing units of the type used on printers for processors, thus excluding preformed planar matrices or cylindrical matrices with composition of metal or synthetic letters. The use of these printing machines should also be avoided when the paper transport cannot be carried out by the punched side bands as in the printers.

In the last case, is that when using the needle head for printing, its movement along two perpendicular directions for scanning the whole label or the like, would render the machine highly expensive and too complicated.

Therefore, it is the object of the present invention to provide a transport device for a label printing machine or the like, which is extremely simple.

It is another object of the invention to develop a substantial torque during the winding up step for separating the self-adhesive label from its support or backing.

It is still another object of the present invention to provide varying leads.

The above mentioned objects have been accomplished by carrying out the paper transport by means of an electronically controlled step-motor, while a friction rewinding means provides

- 4 -

the required torque for carrying out the separation of a label or the like from its support or backing.

- The device carrying out the above described conditions is particularly a device comprising a set of rollers supporting
5. and guiding the band of overprintable material to the writing station and beyond to rewinding, and a step-motor for the band transport, which provides for carrying the band along through a drawing roller in the intervals between the writing of a line and the next line, effecting electronically controlled
  10. and preset intermittent angular rotations, a friction rewinding means being provided.

According to a first embodiment, said friction rewinding means is driven through a clutch by said step-motor.

- A second embodiment contemplates that the rewinding means is
15. provided by a continuously rotating motor, which preferably trasmits a high constant torque through a clutch. Thus, the paper transport is obtained by means of a constant high torque as defined by the clutch calibration; this torque is subtracted by (band stop) or added with (band movement)
  20. the torque developed by the step-motor.

For the paper sliding alignment, the adjustable orientation for at least one roller or for the whole writing plane is

- 5 -

provided.

- Another preferred solution provides that the friction rewinding means is of high adherence or knurled, and particularly the label band is caused to slide with the labels
5. facing the outer surface of the roller forming the friction rewinding means.

- An improvement to the invention is obtained by carrying out the several kinematic movements of the rollers by means of toothed pulleys and belts, whereby the mutual angular position
10. is assured.

- Another improvement to the invention is obtained by providing that the angular rotation by each pitch of the step-motor will cause the advancement of the reel by a full writing height, or preferably by a full fraction of the minimum writing
15. height provided.

Some unrestrictive embodiments of the device according to the invention have been outlined in Figs. 1 and 2, showing perspective views of two embodiments according to the present invention.

20. Referring to the embodiment of Fig. 1, there are shown an unwinding roller 1, an idle roller 2 acting as a damper for

- 6 -

the pulls due to each single forward movement of the step-motor, the writing plane 3, that is the plane on which the needle writing head (not shown for the sake of simplicity) will write, the drawing roller 4 coated with a knurling 4b providing a high adherence, the counter-drawing roller 5 also knurled, the rewinding roller 6, the step-motor 7, the drawing belt 8 for the latter, the drawing clutch 9 which can be adjusted by a spring, the reel 10 of labels to be overprinted, the recovery reel 11, and the photocell 12 for signalling the label end.

10. In the embodiment according to Fig. 2, the corresponding pieces or elements have been denoted by the same reference numerals. However, said roller 4 is provided with a coating 4a having a high adherence, for example rubber. Moreover, at 13 the D.C. rewinding motor has been denoted, at 14 the plane on which the brush 15 bears and improves the adherence of the label band on roller 4, 16 counter-rollers, 17 the clutch adjusting knob, and 18 the cam for the angular adjustment of the writing plane.

The sliding direction for the band to be overprinted is shown by the arrows.

20. The writing unit has not been shown in the drawing as it comprises a conventional needle head and a conventional inked ribbon, both of the type used on the printers of microprocessors.



- 7 -

The electronics governing the control of the motor and photocell has also not been shown in the drawing.

- The two figures of the drawing show two versions of the same device. They basically differ as in Fig. 1 (the most elementary version) there is only one motor 7, while in Fig. 2 the rewinding motor is also shown. In the case of Fig. 2, the movement of the label band occurs when the torque of the rewinding motor 13 adds to the moving torque of the step-motor 7. Stop occurs when the stop torque of the step-motor 7 is subtracted from the torque of the rewinding motor 13. The torque of the rewinding motor 13 is defined by the calibration of clutch 9 and remains constant for a given calibration of the clutch.

- In order that a good operation be assured, it is necessary in both embodiments to meet some conditions, and namely:
- a - the velocity ratio between said motor 7 and drawing roller 4 should be constant. This is obtained by using toothed pulleys and belts (solution shown in the drawing), or by gears.
  - b - the band to be overprinted should not skid relative to the drawing roller 4. This condition is of extreme importance since it is the angular displacement of roller 4 that determines the distance or spacing between the writing lines, and accordingly the graphic setting of the label. In the drawings two different solutions are shown, in Fig. 1 the band is compressed between two knurled rollers 4 and 5

- 8 -

pressed to each other by a spring (not shown), while in Fig.2 the roller 4 is coated with rubber and the counter-roller 5 is knurled.

- c - the recovery of the overprinted band should be assured.
- 5. This condition is true both in case of labels which are rewound after overprint, and for "dispensed" labels (separated from the siliconized support or backing and withdrawn). In the second case, only the support or backing is recovered. The two alternatives shown differ just in the
- 10. solution of this condition.

- In Fig. 1 the rewinding roller 6 is drawn so that the portion of circumference developed by said roller 6 at each rotation of motor 7 is larger than the corresponding portion developed by said roller 4. In Fig. 2 the roller 6 is drawn by motor 13
- 15. (a D.C. or A.C. motor) continuously rotating at a speed such as to provide the condition shown in Fig. 1. Thus by recovering the roller 6 to a higher degree than that allowed by roller 4, the provision of clutch 9 is required enabling pulley 9' to rotate and roller 6 to be blocked when the band is tensioned. In the
  - 20. embodiment according to Fig. 2, there the knob 17 is shown allowing the adjustment of the spring for said clutch 9.

- d - the label band should always be tensioned throughout its path.

- 9 -

This condition has already been fulfilled between the rollers 4 and 6 in accordance with the foregoing at the preceding paragraph. In order to obtain such a condition, the dampening roller 2 is provided in Fig. 1, which roller is rockable about 5. a fulcrum 2' in order to recover any "catenary curve" of the band at each start of said motor 7 to compensate for the pull which would occur due to inertia of reel 10. To prevent said inertia from allowing a larger "catenary curve" than the recovery capability of roller 2, roller 1 is clutched on its shaft in 10. order to facilitate the stop thereof. In Fig. 2 a brush 15 has been inserted for pressing the label band on plane 14, this further assures the adherence of the band to said roller 4 and 16.

e - during its unwinding, the band should not be subjected to  
15. side shifting.

This is a difficult condition to obtain since the band is restrained throughout its path, to assure a perfect parallelism among all of the members on which such a band slides or runs would be expensive. The condition is obtained providing that at least 20. one of said members (1, 2, 4, 5, 6, 16 or writing plane 3) allows an angular adjustment of its geometrical axis. In the drawings, such members are in Fig. 1 respectively the counter-roller 5, the 5a of which may move in the slot 5b, while in Fig. 2 the writing plane 3 is moved by the cam 18.

- 10 -

In both cases, the print end for each label is sensed by the photocell 12 which could be replaced by a switch (not shown) sensing the change in thickness of the band (only support or support plus label).

- 11 -

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C L A I M S

1. A paper handling device for overprinting machines on a band of labels or the like using a needle type of writing head printing on a moving band, characterized in that the band
5. displacement is carried out by an electronically controlled step-motor (7), whereas a friction rewinding means (6) provides the torque required for carrying out the separation of a label or the like from its support or backing.
2. A device according to Claim 1, characterized by
10. comprising a set of rollers supporting and guiding the band of overprintable material to the writing station and beyond to rewinding, and a step-motor (7) for the band transport, the motor providing for drawing the band through a drawing roller (4) in the intervals between the writing of one line
15. and that next, making electronically controlled and preset

- 12 -

5. intermittent angular rotations, a friction rewinding means (6) being provided.

3. A device according to Claim 2, characterized in that said friction rewinding means is driven through a clutch (9) by said step-motor (7).

10. 4. A device according to Claim 2, characterized in that said friction rewinding means is obtained by a continuously rotating motor (13) provided with a clutch (9), so that the torques of the two motors are successively added or subtracted thus moving or stopping the label band.

15. 5. A device according to any of the preceding claims, characterized in that for the band alignment an adjustable orientation of at least one roller (1, 2, 4, 5, 6, 16) or of the whole writing plane (3) is provided.

6. A device according to any of the preceding claims,  
20. characterized in that said drawing roller (4) is of high adherence or knurled.

7. A device according to any of the preceding claims, characterized in that the label band is caused to slide or run with the labels facing the outer surface (4a) of the drawing  
25. roller (4).

- 13 -

5. 8. A device according to any of the preceding claims, characterized in that the several kinematic movements of the rollers are provided by means of toothed pulleys and belts (8), so that the mutual angular position is assured.
9. A device according to any of the preceding claims,
10. characterized in that the angular rotation of each pitch of the step-motor (7) causes the band to advance by a full writing height, or preferably by a full fraction of the minimum writing height provided.

15.7

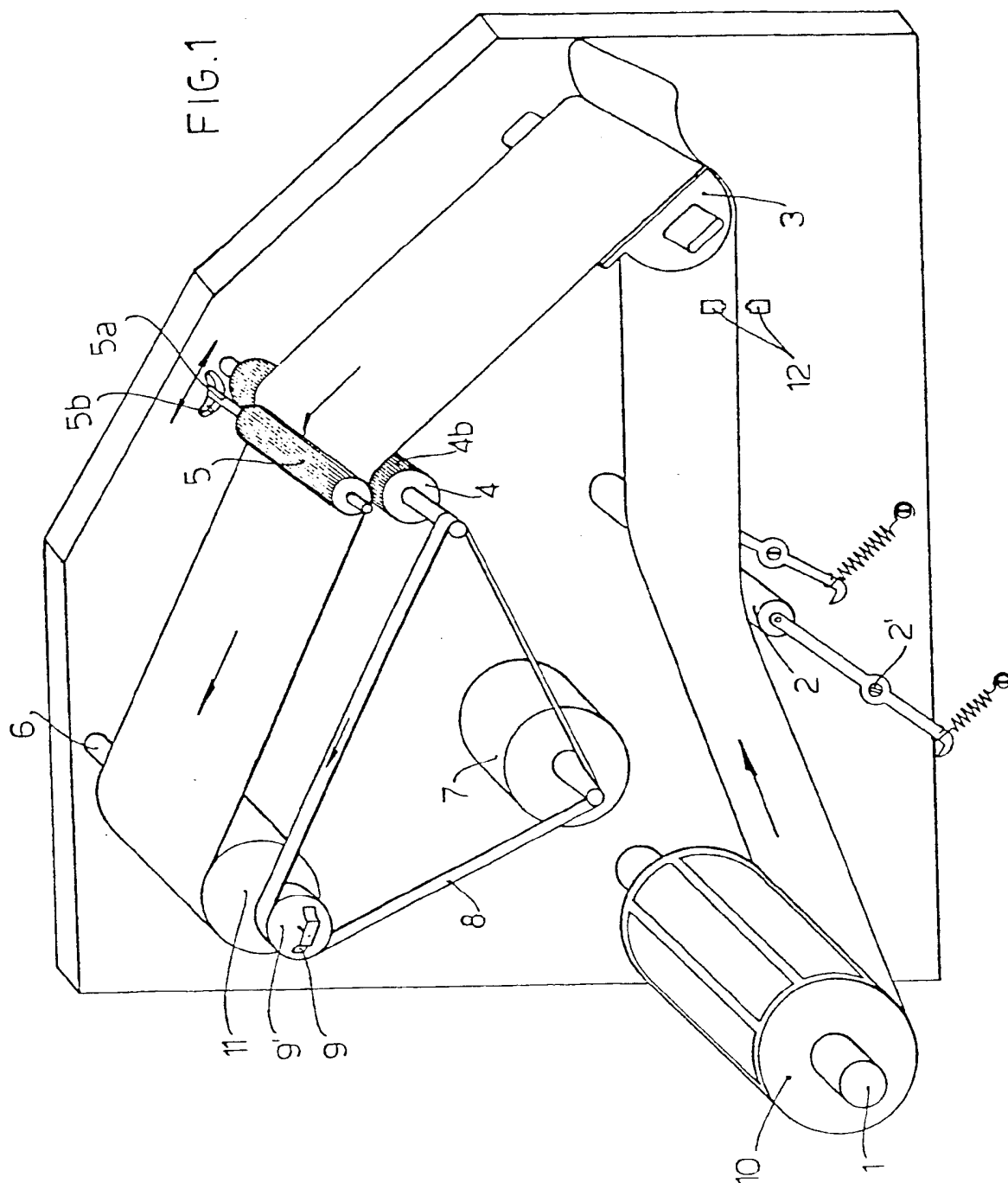
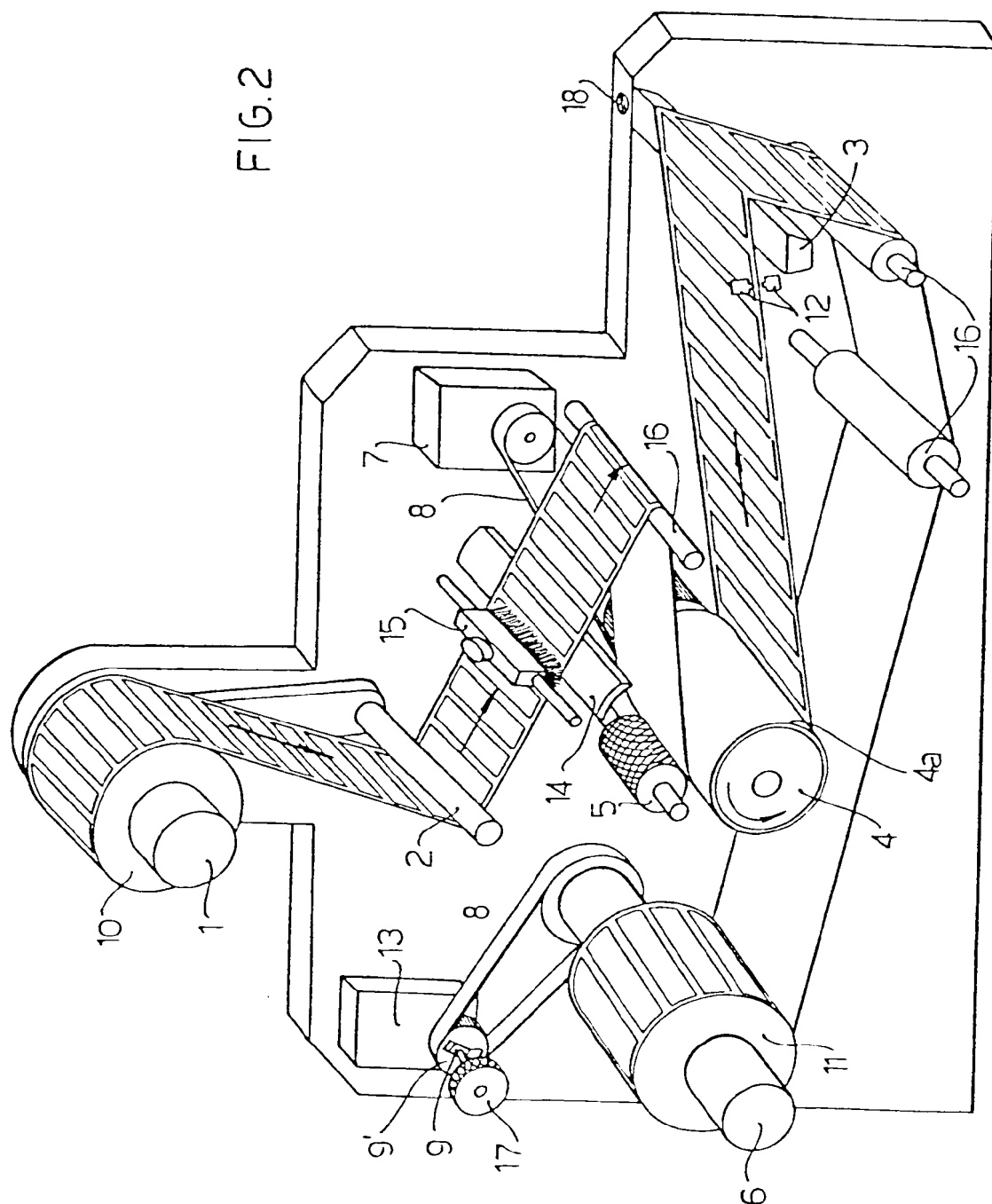




FIG. 2





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# EUROPEAN SEARCH REPORT

0036193

Application number  
EP 81 10 1867

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
P	<u>FR - A - 2 421 108</u> (DU PONT DE NEMOURS)  * Page 4, line 5 to page 8, line 36; figures 1-4 *  ---	1-3, 6, 8	B 65 H 17/22 B 65 C 9/18
	<u>DE - A - 2 243 533</u> (BETTERBUILT)  * Page 5, line 9 to page 6, line 6; figure 1 *  ---	1, 2, 4	
	<u>DE - A - 2 009 816</u> (SCHAFER)  * Page 11, lines 1-29; figure 1 *  ---	1, 7	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	<u>US - A - 4 218 030</u> (AVERY)  * The complete description *  -----	1, 2, 4	B 65 H B 65 C
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			& member of the same patent family corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	23-06-1981	LONCKE	